

CLAIMS

1. A method for conditioning a surface of a polishing pad after chemical-mechanical polishing of a semiconductor substrate with the pad surface, comprising exposing the pad surface to steam.
2. The method of claim 1 wherein the steam is jetted onto the pad surface to impact the surface with a pressure of from about 10 psig to about 20 psig.
3. The method of claim 1 wherein the steam has a temperature of at least about 200°F as it impacts the surface.
4. The method of claim 1 wherein the steam is jetted onto the pad surface from a head which is displaced relative to the pad surface during the exposure of the pad surface to the steam.
5. The method of claim 1 wherein the pad has a contaminant associated therewith prior to the conditioning, and wherein a chemical agent suitable for reacting with the contaminant is within the steam during the exposure of the pad surface to the steam.

6. The method of claim 1 wherein ammonium is within the steam during the exposure of the pad surface to the steam.
7. The method of claim 1 wherein ammonium citrate is within the steam during the exposure of the pad surface to the steam.
8. The method of claim 1 wherein the chemical-mechanical polishing utilizes the pad to polish a copper-containing material; and wherein ammonium is within the steam during the exposure of the pad surface to the steam.
9. The method of claim 1 wherein the pad is rubbed against a conditioning stone during the exposure to the steam.
10. The method of claim 1 wherein the pad is rubbed against a conditioning stone prior to the exposure to the steam.
11. The method of claim 1 wherein the pad is rubbed against a conditioning stone after the exposure to the steam.

12. A method for conditioning a surface of a polishing pad after chemical-mechanical polishing of a semiconductor substrate with the pad surface, comprising:

providing an apparatus which includes a steam outlet port proximate a conditioning stone;

positioning the pad with the pad surface against the conditioning stone and displacing the pad relative to the condition stone to rub the pad surface with the condition stone; and

flowing steam through the outlet port and across the pad surface as the pad surface is rubbed with the conditioning stone.

13. The method of claim 12 wherein the steam is jetted onto the pad surface to impact the surface with a pressure of from about 10 psig to about 20 psig.

14. The method of claim 12 wherein the steam has a temperature of at least about 200°F as it flows through the outlet port.

15. The method of claim 12 wherein the steam has a temperature of at least about 200°F as it flows through the outlet port, and impacts the surface with a pressure of from about 10 psig to about 20 psig.

16. The method of claim 12 wherein ammonium is within the steam during the exposure of the polishing surface to the steam.

17. The method of claim 12 wherein ammonium citrate is within the steam during the exposure of the pad surface to the steam.

18. The method of claim 12 wherein the chemical-mechanical polishing utilizes the pad to polish a copper-containing material; and wherein ammonium is within the steam during the exposure of the polishing surface to the steam.

19. The method of claim 12 further comprising:
removing the pad surface from against the conditioning stone to complete the conditioning of the pad surface with the conditioning stone; and
after the conditioning of the pad surface with the conditioning stone is completed, exposing the pad surface to additional steam.

20. A method for chemical-mechanical polishing of a semiconductor substrate with a polishing pad surface and reconditioning the pad surface, comprising:

providing a semiconductor substrate having a surface which is to be chemical-mechanical polished;

providing a polishing pad proximate the semiconductor substrate surface and utilizing a surface of the polishing pad to chemical-mechanical polish the semiconductor substrate surface;

providing an apparatus which includes a steam outlet port proximate a conditioning stone;

positioning the pad with the pad surface against the conditioning stone and displacing the pad relative to the condition stone to rub the pad surface with the condition stone; and

flowing steam through the outlet port and across the pad surface as the pad surface is rubbed with the conditioning stone.

21. The method of claim 20 wherein the steam is jetted onto the pad surface from a plurality of nozzles generating overlapping spray patterns of the steam.

22. The method of claim 20 wherein the steam is jetted onto the pad surface from a plurality of nozzles generating overlapping spray patterns of the steam; and wherein the nozzle spray patterns are fans in which the steam impacts the pad surface at angles from 0° to 45°.

23. The method of claim 20 wherein the steam is jetted onto the pad surface from a plurality of nozzles.
24. The method of claim 20 wherein the steam is jetted onto the pad surface to impact the surface with a pressure of from about 10 psig to about 20 psig.
25. The method of claim 20 wherein ammonium is within the steam during the exposure of the polishing surface to the steam..
26. The method of claim 20 wherein ammonium citrate is within the steam during the exposure of the pad surface to the steam.
27. The method of claim 20 wherein the semiconductor substrate comprises a copper-containing material at the surface which is chemical-mechanical polished; and wherein ammonium is within the steam during the exposure of the polishing surface to the steam.

28. The method of claim 20 further comprising:
 - removing the pad surface from against the conditioning stone to complete the conditioning of the pad surface with the conditioning stone; and
 - after the conditioning of the pad surface with the conditioning stone is completed, exposing the pad surface to additional steam.
29. An apparatus for conditioning a surface of a polishing pad after chemical-mechanical polishing of a semiconductor substrate with the pad surface, comprising:
 - a conditioning stone; and
 - a steam outlet port proximate the conditioning stone; the steam outlet port being configured to jet steam onto the pad surface during the conditioning of the pad surface.
30. The apparatus of claim 29 wherein the polishing pad is configured for utilization in a web chemical-mechanical polishing tool.
31. The apparatus of claim 29 configured to jet the steam onto the pad surface such that the steam impacts the surface with a pressure of from about 10 psi to about 20 psi.

32. The apparatus of claim 29 wherein the steam outlet port is configured to move relative to the pad surface as steam is jetted out of the port and against the pad surface.
33. The apparatus of claim 29 further comprising a source of steam in fluid communication with the steam outlet.
34. The apparatus of claim 33 wherein the source comprises ammonium within the steam.
35. The apparatus of claim 33 wherein the source comprises ammonium citrate within the steam.